

REMARKS

Applicants respectfully request reconsideration and allowance of the pending claims.

I. Status of the Claims

Upon entry of this amendment, claims 30-34, 36-38, 56-60, and 63-67 remain pending. Claim 30 has been amended to clarify that the deposition of the bronze occurs when the current is passed between the anode and the substrate. Claims 63-67 have been amended to require copper and tin ion concentrations. Support for these amendments may be found in applicants' published application at paragraphs [0018], [0030], and [0031] and at Examples 1 (4 g/L Sn^{2+} ; 18 g/L Cu^{2+}), 2a (4 g/L Sn^{2+} ; 18 g/L Cu^{2+}), 2b (4 g/L Sn^{2+} ; 18 g/L Cu^{2+}), 3 (5 g/L Sn^{2+} ; 10 g/L Cu^{2+}), and 5 (4 g/L Sn^{2+} ; 18 g/L Cu^{2+}). See also In re Wertheim, 541 F.2d 257 (CCPA 1976) (A claim directed to a method of preparing an extract having from 35 to 60% solids content held to be supported by a specification disclosing an extract having from 25 to 60% solids content and two examples in which the extract had 36% and 50% solids content).

II. Double Patenting

The pending claims are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-27 of co-pending application Ser. No. 11/105,947. Unless and until the co-pending application matures into a patent, however, the appropriateness of such a rejection cannot be ascertained. Applicant will consider filing a terminal disclaimer to obviate this rejection when the application is otherwise in condition for allowance.

III. Claim Rejections Under 35 U.S.C. §112

Claim 30 has been amended to clarify that the deposition of the bronze occurs when the current is passed between the anode and the substrate. In view of this amendment, applicants submit that the claim language is clear and respectfully request that the rejection be withdrawn.

IV. Claim Rejections Under 35 U.S.C. §§102(e)/103(a)

Reconsideration is requested of the rejection of claims 30 through 38 and 59 as being anticipated by or in the alternative obvious over Yanada et al. (U.S. 6,508,927).

Claim 30 is directed to a method for electrolytic deposition of bronze onto a substrate, the method comprising:

i) immersing the substrate in an aqueous acidic electrolyte having a pH less than about 1 and comprising:

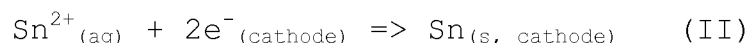
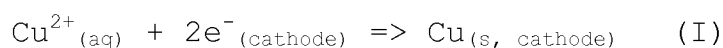
- a) tin ions;
- b) copper ions;
- c) an alkylsulfonic acid;
- d) an aromatic, nonionic wetting agent; and
- e) an oxidation inhibitor;

wherein a ratio of tin ion concentration to copper ion concentration is sufficient to electrolytically deposit a bronze having a copper content of greater than about 60%; and

(ii) applying a current through a copper-tin anode and the substrate at a current density sufficient to electrolytically deposit bronze having the copper content greater than about 60% onto the substrate.

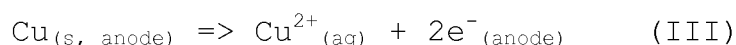
Applicants' method as defined by claim 30 requires deposition from a composition comprising tin ions, copper ions, an alkylsulfonic acid, an aromatic, nonionic wetting agent, and an oxidation inhibitor. Deposition occurs by applying a current through a copper-tin anode and the substrate. At the substrate, i.e., the workpiece to be coated with bronze, a reduction

reaction occurs whereby tin ions and copper ions are reduced to tin metal and copper metal as a bronze alloy. The reduction reactions at the cathode (the "substrate" in claim 30) may be represented by the following equations (I) and (II):

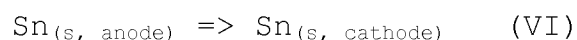
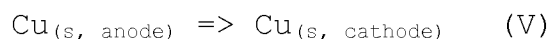


The use of "cathode" in the subscripts in the above equations indicates that the cathode provides the electrons that reduce the copper ions and tin ions into the Cu metal and Sn metal onto the workpiece.

The electrons that reduce copper ions and tin ions have a source, which is the anode. In general electrolytic deposition methods, the anode may be an inert anode or a soluble anode. An inert anode, such as a platinum anode, oxidizes solution components to extract electrons to be used in the metal reduction at the cathode. Oxidation of solution components may cause waste products to build up, which is not always desirable. A soluble anode, on the other hand, such as the copper-tin anode required by claim 30, is itself oxidized. Applicants' copper-tin anode is oxidized according to the following equations (III) and (IV):



The electrons in equations (III) and (IV) travel through the circuitry of the rectifier to the workpiece. Thus, the electrons in equations (III) and (IV) are identical to the electrons in equations (I) and (II). Therefore, equations (I) through (IV) may be balanced to yield the overall reaction, represented by equations (V) and (VI):



Essentially, therefore, applicants' method defined by claim 30 transfers copper and tin from the copper-tin anode to the cathode workpiece to yield a bronze coating thereon having the claimed greater than about 60% by weight Cu. Initial concentrations of copper ions and tin ions are added to the electrolytic solution to provide metal ions to initiate the reaction and provide the ratio for copper and tin ions to yield the desired copper content in the bronze, while the copper-tin anode is used as a source of copper ions and tin ions throughout deposition.

The use of a copper-tin anode is advantageous for several reasons. First, by employing an anode comprising copper and tin, one need not, when plating a copper-tin alloy (i.e., a bronze) on a cathode workpiece, introduce all of the copper ions and tin ions into solution to adequately coat a workpiece with the bronze. The copper-tin anode itself may provide copper ions and tin ions in solution as deposition progresses. Related thereto, since the concentrations of copper ion and tin ion may be decreased, the concentrations of other solution components, such as nonionic wetting agents and brighteners, may also be decreased since the need for organics to stabilize the solution is lessened. Second, since the anode itself is oxidized, organic components in the solution are not oxidized, thus decreasing the buildup of undesirable waste products. Third, the use of a copper-tin anode enhances control of the copper-to-tin ratio in the deposited bronze. As deposition progresses and copper ions and tin ions are depleted from solution, the copper-tin anode provides copper ions and tin ions to replenish the solution with metal ions, thereby maintaining the uniformity of the copper ion and tin ion concentrations in solution, which thereby enhances the uniformity of the bronze coating on the cathode.

Accordingly, use of a copper-tin anode allows one to deposit, for example a 60% copper/40% tin bronze that will have that concentration of copper metal and tin metal throughout the beginning, middle, and the end of deposition, such that the initial deposit, the bulk of the layer, and the top layer all have substantially the same composition. Finally, since the copper-tin ratio may be carefully controlled through the use of the copper-tin anode, deposition may occur at a wide variety of copper densities. See applicants' specification at paragraph [0011], which states that deposition may occur at a current density as low as 0.1 ASD or as high as 120 ASD.

Yanada et al. disclose a method for depositing tin-copper alloys onto substrates. Yanada et al.'s plating solution comprises tin ions, copper ions, an alkane sulfonic acid or a aromatic sulfonic acid, a component (A) selected from among carboxylic acid, lactone, phosphoric acid, and phosphonic acid, a component (B) selected from among sulfuric acid, hydrochloric acid, nitric acid and water soluble salts thereof, a bath stabilizer selected from among thiols and thioamides, and a surfactant.

Yanada et al. state that the tin content may vary from 99.99 to 10 wt.% and the copper content may vary from 0.01 to 90 wt.%. But Yanada et al. do not disclose anywhere in their specification a method, a solution, or the conditions necessary to deposit a tin-copper alloy having a copper content of greater than 60%, or even provide the ordinarily skilled person with any reasonable basis for concluding that Yanada et al.'s method may successfully deposit a bronze having a copper content of greater than 60%. Rather, Yanada et al. disclose a preference for tin-copper alloys having tin contents of "more than 50 wt%, preferably more than 70 wt%, and more preferably more than 90 wt%." See Col. 8, lines 14-29. Moreover, each and every alloy

deposited in Yanada et al.'s examples had 22 wt.% Cu or less, and most often significantly less copper. ***So it is apparent that Yanada et al.'s work was with high-Sn bronzes, not high-Cu bronzes; and that their isolated and cryptic reference to "0.01 to 90% Cu" is an artifact of the scrivener's effort to be inclusive rather than a substantive disclosure having any meaning to an art-skilled reader.***

Yanada et al. provide broad tin ion concentration ranges at Col. 3, lines 1-9, ranging from 1 to 99 g/L or from 5 to 59 g/L tin ion. The minimum tin ion concentration in Yanada et al.'s examples is 7 g/L, but in that Example 24, the deposited alloy had only 6.4 wt% Cu. Yanada et al.'s copper concentration ranges from 0.001 to 99 g/L, or 0.01 to 54 g/L, or from 0.001 to 30 g/L or from 0.01 to 18 g/L. The maximum copper ion concentration in any example is 6 g/L, but that is in Comparative Example 13, which further comprised 24 g/L tin ions and the deposited alloy had only 18 wt% Cu. Typical copper ion concentrations are less, such as 4 g/L, 3 g/L, 2 g/L, or even less, such as 0.5 g/L or 0.2 g/L. Yanada et al. do not provide the ordinarily skilled person with any guidance toward or any reason to select the tin and copper ion concentrations to deposit a high copper bronze.

Yanada et al. disclose the use of anodes comprising tin alloyed with another metal, such as copper. While a tin-copper alloy is used as an anode in some of Yanada et al.'s examples, Yanada et al. never disclose anywhere in their specification a method, a solution, or the conditions necessary to deposit a tin-copper alloy having a high copper content. Moreover, Yanada et al. do not disclose anywhere the use of an anode whose composition is sufficient to deposit a high copper bronze. In fact, the highest copper content in any of the tin-copper alloys exemplified therein is no more than 22 wt.% Cu, which indicates

that Yanada et al. employed tin-copper anodes having a higher concentration of tin than copper.

The Office has cited Yanada et al., Tsuji et al., Dietterle et al., and various other references in past Office actions. None of these references disclose a method, a solution, or the conditions necessary to deposit a tin-copper alloy having a copper content of at least 60 wt.%. None of the examples in the various references disclose an electrodeposition method for depositing a bronze having at least 60 wt.% copper. Such a solution, or any reason for preparing it, is wholly absent from the prior art. It is evident the isolated and cryptic references to essentially the entire gamut from no Cu to 100% Cu are a patent drafting tactic to be inclusive and not any substantive disclosure having any meaning to an art-skilled reader.

Yet, the Office continues to assert that claim 30's method for depositing bronzes having at least 60% copper is obvious in view of Yanada et al. since Yanada et al.'s disclosure of very broad tin ion and copper ion concentrations "is sufficient to electrolytically deposit a bronze comprising at least about 60% by weight Cu" or at least about 80% by weight Cu (claim 28) or at least about 90% by weight Cu (claim 29).

With regard to anticipation of ranges, MPEP §2131.03 Part II states:

II. PRIOR ART WHICH TEACHES A RANGE OVERLAPPING OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY"

When the prior art discloses a range which touches or overlaps the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with

"sufficient specificity to constitute an anticipation under the statute." What constitutes a "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, and the reference teaches a broad range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. See, e.g., *Atofina v. Great Lakes Chem. Corp*, 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006) wherein the court held that a reference temperature range of 100-500°C did not describe the claimed range of 330-450°C with sufficient specificity to be anticipatory.

In this case, MPEP §2131.03 Part II applies since Yanada et al. disclose a range of 0.01 to 90 wt.% copper and applicants' claimed range is a copper content greater than about 60%. In this regard, the claim range covers only the highest 33% of the disclosed range. Since no examples fall within the claimed range, the MPEP endorses a "case by case determination" as to anticipation.

The holding of *Atofina v. Great Lakes Chem. Corp* is particularly instructive on this point. In that case, the claimed range from 330-450°C was encompassed by a prior art range of 100-500°C, but no examples fell within the claim range. In *Atofina*, the claimed range covered 30% of the prior art range, and the Federal Circuit concluded that the reference range did not describe the claimed range with sufficient specificity to be anticipatory. In the present case, claim 30's range covers just slightly more, 33%, of the claimed range. Since the range of the claim in the present case covers just slightly more of the reference range than the claimed range in *Atofina* (note that this is a 2006 decision), applicants respectfully submit that Yanada et al.'s disclosed range does not describe the claimed range with sufficient specificity to be

anticipatory. In view thereof, applicants respectfully request withdrawal of the anticipation rejection.

With regard to obviousness, as stated by the MPEP §2142, The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007) noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). See also *KSR*, 550 U.S. at ___, 82 USPQ2d at 1396 (quoting Federal Circuit statement with approval).

Moreover, with regard to the burden of proof:

If the examiner determines there is factual support for rejecting the claimed invention under 35 U.S.C. 103, the examiner must then consider any evidence supporting the patentability of the claimed invention, such as any evidence in the specification or any other evidence submitted by the applicant. The ultimate determination of patentability is based on the entire record, by a preponderance of evidence, with due consideration to the persuasiveness of any arguments and any secondary evidence. *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). The legal standard of "a preponderance of evidence" requires the evidence to be more convincing than the evidence which is offered in opposition to it.

In view of the standards of obviousness as articulated by the Supreme Court in *KSR International Co. v. Teleflex Inc.* and by the Federal Circuit in *In re Kahn* and *In re Oetiker*, obviousness cannot be based on mere conclusory statements but must be supported by clearly articulated reasons with some rational underpinning. Moreover, the record as a whole must show that

the claims are obvious by a preponderance of the evidence. It is incumbent on the Office, therefore, to consider not just the limited disclosures picked by the Office in establishing *prima facie* obviousness but the references as a whole. In this regard, teaching away is important and must be considered, lack of examples is important and must be considered, and lack of any rationale for making the claimed modification is important and must be considered.

The Office has asserted that the various elements selected from various reference renders the claims obvious. In particular, the Office has focused on language in various references that states that tin-copper alloys may be deposited having from 0.01 to 90 wt% copper (Yanada et al.) or 0.1 to 99.9% Cu (previously cited Dietterle et al.). Each reference also provides broad ranges of copper ion concentrations and tin ion concentrations that are asserted to be "sufficient" to provide the ordinarily skilled person with guidance for selecting concentrations to achieve a method for depositing a high copper bronze.

The Office's assertions that this limited disclosure provides a basis for finding the claims *prima facie* obviousness are deficient, however, since no clearly articulated reason why the ordinarily skilled person would seek to modify the references in the way the Office has been proposed. The Office has resorted to the conclusory assertion that the broad ion concentrations are "sufficient." While the references may have provided enough examples that the ordinarily skilled person may derive ratios of tin ion concentrations and copper ion concentrations sufficient for depositing tin-copper alloys having high **tin** contents, the references lack any such disclosure that would have guided the ordinarily skilled person toward ratios sufficient to deposit high **copper** bronzes, or

would have provided the ordinarily skilled person with any reason for selecting such ratios. In fact, the prior art of record provided the ordinarily skilled person with ample reason not to select such ratios. Yanada et al., for example, state that their method is useful for "soldering or for etching resist" and in this context, "the content of tin should be more than 50 wt %, preferably more than 70 wt %, and more preferably more than 90 wt%..." See Col. 8, lines 25-29. Each and every example therein employs solutions having substantially higher tin ion concentrations than copper ion concentrations, and no example deposited a tin-copper content greater than 22 wt.%.

Yanada et al. further state that "The alloy composition should be selected according to the intended use." See Col. 8, lines 22-24. The Office may assert that if the intended use calls for a bronze, then Yanada et al. may have given the ordinarily skilled person reason to alter the tin ion and copper ion concentrations in a manner sufficient to deposit a bronze having greater than 60% copper. Even though Yanada et al. state that the composition is determined by the intended use, Yanada et al.'s only disclosed intended uses include solder or etching resist, in which case "the content of the tin should be more than 50 wt%..." Yanada et al. did not provide any intended uses for a bronze having a copper content greater than 60%, nor had other previously cited references, such as Dietterle et al. and Tsuji et al. In fact, even though Yanada et al. briefly mention of high copper alloys with tin, Yanada et al. disclose no uses for the bronzes and even state "These plating baths, however, do not serve as a substitute for tin plating baths or tin-lead alloy plating baths applied to electronic parts and printed circuit boards." See Col. 1, lines 31-41. In short, none of the prior art of record discloses a use for a bronze having a copper content of at least 60% that would have given the

ordinarily skilled person a reason to select tin ion and copper ion concentrations sufficient to deposit a high copper bronze. If anything, Yanada et al. teach away from deposition of high copper bronzes by stating that they are particularly inapplicable to the intended uses of their deposition compositions.

Moreover, the ample disclosure directed to high tin solders and single gratuitous statement that the copper content may vary broadly from 0.01 to 90 wt% are further significant since, under the proper preponderance standard, obviousness may only be found when the weight of the evidence in favor of obviousness outweighs the weight of the evidence supporting the nonobviousness of the claims. The inquiry requires the Office to consider the "prior art reference ... in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)." See MPEP §2141.02 Part VI. Taken as a whole, the cited Yanada et al. reference (and the other references previously made of record) clearly describe methods and compositions for depositing tin-rich solder alloys, and none of the art of record discloses any methods or compositions for deposition of copper rich bronzes or provides any guidance or reason, (i.e., no intended uses that would have given a reason) to prepare compositions for the deposition of copper-rich bronzes.

Additionally, *prima facie* obviousness is not established unless the Office can show that the result of the combination or modification would have provided the ordinarily skilled person with a reasonable expectation of success. See MPEP §2143.02 and

the Exemplary rationales described in MPEP §2143.¹ During the course of prosecution of related application Ser. No.

11/105,947, applicants filed an Amendment D, which described the state of the art at the time of the filing of their application:

Historically, the ordinarily skilled person in the field of electrolytic plating of bronzes resorted to alkaline solutions that depended on the use of copper cyanide processes. An early patent in this field, U.S. 1,970,549 (Dated August 21, 1934) discloses such a bronze electrolytic plating process from a solution comprising copper cyanide, sodium stannate, sodium hydroxide, and sodium cyanide.

As of the time of applicants' invention, (about 70 years after issuance of U.S. 1,970,549) electrolytic bronze plating still depended mainly on plating from an alkaline solution comprising copper cyanide. In fact, only one other alternative was developed which involved plating from pyrophosphate-based solutions. Evidence for this is shown in the cited Dietterle et al. reference, which discuss the state of the art of deposition of high copper bronzes. For example, Dietterle et al. disclose (as of September, 2000) at paragraphs [0008]-[0009] that the electrolytic deposition of high copper bronzes employs alkaline deposition solutions, which introduce copper ion in the form of the cyanide complex $\text{Cu}(\text{CN})_2^-$.

Dietterle et al. also state that the alkaline-cyanide based methods are beset by at least a couple disadvantages: (1) deposition is slow since the tin ion is introduced as the tin(IV) ion (requiring 4 electrons for deposition) as a stannate salt rather than the tin(II) ion (requiring only 2 electrons for deposition), and (2) the cyanide complex is highly toxic.

Additional contemporary prior art references show that electrolytic deposition of bronzes was, at the time of applicants' invention, mainly limited to alkaline-cyanide based solutions and pyrophosphate-based solutions. For example, **U.S. 6,508,927 (filed November 4, 1999) discloses, in their background, that then available methods for electroplating bronzes**

¹ In the context of MPEP §2143, the Office must show "predictable results" as in Examples A through D, or "reasonable expectation of success" as in Example E and G.

employed alkali cyanide or alkali pyrophosphate as complexing agents. This reference is (like Dietterle et al. and Tsuji et al.) directed to the deposition of tin-copper alloys having copper contents less than 10% by weight, as shown by the examples disclosed therein, in which the highest copper content in alloys deposited from exemplary compositions disclosed therein is 21.4% by weight. U.S. 6,458,264 (filed October 5, 2000) discloses, in their background, that deposition of bronzes was then limited to deposition from copper cyanide-alkaline stannate baths, pyrophosphoric baths, and copper cyanide-copper pyrophosphate baths. This patent discloses including a thiourea in the deposition solution, but the reference is (like Dietterle et al. and Tsuji et al.) directed to the deposition of tin-copper alloys having at least 96% tin and thus offers no solution to problems related to the deposition of high copper bronzes.

U.S. 6,508,927 is the currently cited Yanada et al. reference. The art of record in this case, therefore, recognized that bronze electroplating employed alkaline baths containing alkali cyanide or alkali pyrophosphate as complexing agents -- currently, no other art of record offers a solution that meets the requirements of applicants' claims. Therefore, Yanada et al. agree with applicants' assertion that the prior art at the time of the filing of applicants' application had yet to disclose a successful solution to the problem of plating bronzes from acidic electrolytes.

Since none of Yanada et al.'s examples show successful deposition of a bronze, the ordinarily skilled person could only have concluded that Yanada et al. did not provide the solution either. Therefore, since Yanada et al. merely recognized the problem and did not provide any solution, the ordinarily skilled person would not have concluded that Yanada et al.'s compositions and methods would have been reasonably successful at depositing bronzes. Since the requisite predictability or

reasonable expectation of success is lacking, the Office has not established *prima facie* obviousness.

Note that this is not an argument on the operability or inoperability of the Yanada et al. reference. Applicants submit that given (1) the weight of the disclosure in Yanada et al. toward depositing tin rich bronzes, (2) the single statement that the copper content may be as high as 90 wt% depending upon the intended use, and (3) Yanada et al.'s admission that bronzes are deposited from strong alkaline baths using alkali cyanide or alkali pyrophosphate with no countervailing methods or examples in Yanada et al. that show deposition of a high copper bronze, Yanada et al., considered as a whole, would have provided the ordinarily skilled person with no basis for concluding that their method is applicable to depositing high copper bronzes and thus would have given the ordinarily skilled person no reason to modify the tin ion and copper ion concentration to accomplish that goal.

Since the Office has failed to show any reference describing any method or solution that would have provided the ordinarily skilled person with a basis for concluding that bronzes could be successfully deposited from solutions having the elements of claim 30 and since Yanada et al. would have, in fact, led the ordinarily skilled person away from the deposition of high copper bronzes, applicants submit that claim 30 is patentable. In view thereof, applicants respectfully request that the obviousness rejection be withdrawn.

Claims 31 through 38 and 59 depend from claim 30 and are patentable for the same reasons as claim 30 and by virtue of the additional requirements therein.

V. Claim Rejections Under 35 U.S.C. §103(a)

A. Over Yanada et al.

Reconsideration is requested of the rejection of claims 56 through 58 as being obvious over Yanada et al. (U.S. 6,508,927).

Claims 56 through 58 depend from claim 30 and are patentable for the same reasons as claim 30 and by virtue of the additional requirements therein.

B. Over Yanada et al. and Tsuji et al.

Reconsideration is requested of the rejection of claim 60 as being obvious over Yanada et al. (U.S. 6,508,927) in view of Tsuji et al. (U.S. 6,607,653).

Claim 60 depends from claim 30 and is patentable for the same reasons as claim 30 and by virtue of the additional requirements therein.

C. Over Yanada et al.

Reconsideration is requested of the rejection of claims 63 through 67 as being obvious over Yanada et al. (U.S. 6,508,927).

Claims 63 through 67 are directed to a particularly advantageous embodiment of applicants' inventive bronze deposition method in that the concentrations of tin ions and copper ions are relatively low. I.e., the tin ion concentration is no greater than 5 g/L, and the copper ion concentration is no greater than about 18 g/L. The copper-tin anode itself provides copper ions and tin ions in solution as deposition progresses. Since the concentrations of copper ion and tin ion are low, the concentrations of other solution components, such as nonionic wetting agents, substituted dithioglycol brighteners, and oxidation inhibitors, may also be decreased since the need for organics to stabilize the solution is lessened.

Therefore, applicants have provided a unique solution to the problem of depositing bronzes from acidic electrolytes by providing a method using an acidic electrolyte having relatively

low concentrations of copper ions and tin ions and depositing the bronze by passing a current between a copper-tin anode and a cathode, wherein said copper-tin anode allows for uniform control of the composition of the bronze from initial deposition to completion of the bronze layer.

Yanada et al. do not disclose anywhere in their specification the unique advantage that applicants discovered that may be obtained by using a copper-tin anode, and in particular, do not disclose the use of relatively low tin ion and copper ion concentrations. With regard to the tin ion concentration, Yanada et al. disclose a broad range from 1 to 99 g/L, but further disclose that tin ion concentration should be "particularly 5 to 59 g/L in terms of tin" at Col. 3, line 2. Applicants' claimed range of tin ion concentration between about 2 g/L and 5 g/L therefore covers only 3% of the broadest disclosed range and merely touches, but does not overlap, with the preferred range.

In this context, therefore, although a *prima facie* case of obviousness may exist, MPEP §2144.05 Part III. states:

A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997).

The *prima facie* case of obviousness is effectively rebutted herein since the cited Yanada et al. expressly prefer higher concentration ranges than the maximum tin ion concentration allowed by claims 63 through 67, which is a material teaching away. Moreover, the lowest tin concentration used in any of Yanada et al.'s examples is 7 g/L, which is 40% higher than the maximum tin ion concentration allowed by the claims, which is a material teaching away.

Moreover, the overlap of claimed ranges is stated by MPEP §2144.05 Part I. to merely establish *prima facie* obviousness. Under the proper standard of obviousness under *KSR* and *Oetiker*, it is incumbent upon the Office to conclude that a claim is obvious only when a preponderance of the evidence that is available suggests that the claim obvious. Stated simply, even if the Office establishes *prima facie* obviousness, the Office must balance the suggestive weight of evidence both for and against the patentability of the claims. Herein, the Yanada et al. reference does not disclose methods, compositions, or conditions necessary for depositing high copper bronzes. Accordingly, neither reference would have provided the ordinarily skilled person with any reason whatsoever for selecting the lowest tin ion concentrations of the broadest ranges disclosed therein and prepare compositions having a tin ion concentration within the range required by the claims to deposit copper rich bronzes or for any other reason.

Since the only evidence of *prima facie* obviousness is a single broad, non-preferred concentration range, and the evidence of non-obviousness includes a) the material teachings of preferred ranges outside the claimed range, b) examples outside the claimed range, and c) stark absence of any reason whatsoever in either reference to modify the references to prepare solutions containing tin ion concentrations within the claims ranges, applicants respectfully submit that, on balance, claims 63 to 67 are non-obviousness in view of the combination of references. Applicants therefore request that the rejection be withdrawn.

CONCLUSION

In view of the foregoing, applicants respectfully request reconsideration and allowance of the pending claims.

Respectfully submitted,

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